

II. REMARKS

By the present paper, claims 17 and 24 have been cancelled without prejudice, claims 12, 14, 18, 21 and 22 have been amended, and add new claims 25-29 have been added. More specifically, claim 12 has been amended to improve clarity and form, and to incorporate subject matter from previous claims 14 and 17. Claim 12 has also been amended to recite “wherein the cover is made with a material that is friable or breakable” as supported on page 3, lines 7-13, of Applicants’ specification as originally filed. Claim 12 has also been amended to recite

“wherein the space is substantially of smaller dimension than the thickness of the cover in order to facilitate mounting of the cover on the rim of the lateral wall of the main part and in order to avoid propagation on the cover of lateral shock against the rim,”

as supported on page 3, lines 1-13, and on page 4, lines 16-25, and by Figure 2, of Applicants’ disclosure as originally filed.

Claim 14 depends upon claim 12, and has been amended to delete subject matter added to claim 12. Dependent claims 18, 21 and 22 have been amended to recite a “first housing” in accordance with base claim 12. Claim 18 has been further amended to improve grammar. Thus, the present amendment has no further limiting effect on the scope of claims 14, 18, 21 and 22.

New independent claim 25 has been added to recite an embodiment of the present invention incorporating subject matter from previous claim 12 and subject matter described on page 3, lines 7-10, of Applicants’ specification as originally filed. New claim 26 depends upon claim 25, and further recites

“wherein a height of the one part of the rim surrounding the lateral surface of the cover is larger than or equal to a thickness of the cover fixed onto the rim, and wherein the one part of the rim entirely surrounds the lateral surface of the cover,”

as supported by previous claim 14. New claim 27 depends upon claim 25, and further recites

“wherein a space is provided between the lateral surface of the cover and the one part of the rim surrounding the cover, wherein the space is substantially of smaller dimension than the thickness of the cover in order to facilitate mounting of the cover on the rim of the lateral wall of the main part and in order to avoid propagation on the cover of lateral shock against the rim,”

as supported by previous claim 17 and on page 3, lines 1-13, and on page 4, lines 16-25, and by Figure 2, of Applicants’ disclosure as originally filed.

New claims 28 and 29 depend upon claims 12 and 25, respectively, and further recite “an integrated circuit arranged in a second housing of the case, wherein the second housing is delimited by the lateral wall and the base of the main part, and wherein the at least one resonator element is vacuum enclosed in the first housing, and the second housing is filled with resin encapsulating the integrated circuit” as supported on page 5, lines 24-36, and on page 6, lines 6-8, and by Figure 2, of Applicants’ disclosure as originally filed.

The present amendment adds no new matter to the above-captioned application.

A. The Invention

The present invention pertains broadly to an electronic component comprising at least one resonator element arranged in a first housing of a case. In accordance with an embodiment of the present invention, an electronic component comprising at least one resonator element arranged in a first housing of a case is provided that includes features recited by independent claim 1. In accordance with another embodiment of the present invention, an electronic component comprising at least one resonator element arranged in a first housing of a case is provided that includes features recited by independent claim 25. Various other embodiments, in accordance with the present invention, are recited by the dependent claims.

An advantage provided by the various embodiments, in accordance with the present invention, is that an electronic component is provided that has a hermetically sealed first

housing, wherein the cover used to seal the first housing is protected by lateral shock even though the cover is made with material that is friable or breakable during manipulation of the electronic component. Thus, a part of the rim of the lateral wall of the main part of the case, which surrounds the lateral surface of the cover, protects the cover without having to have the corners and side faces of the cover ground in accordance with special conventional processes.

B. The Rejections

Claims 12-15, 17-19 and 21-23 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Shimizu et al. (U.S. Patent Application Publication No. 2003/0168944 A1, hereafter the “Shimizu Publication”) in view of Luff (U.S. Patent No. 6,456,168, hereafter the “Luff Patent”). Claim 16 stands rejected under 35 U.S.C. §103(a) as allegedly unpatentable over the Shimizu Publication in view of the Luff Patent and Kizaki et al. (U.S. Patent No. 5,841,217, hereafter the “Kizaki Patent”). Claim 20 stands rejected under 35 U.S.C. §103(a) as allegedly unpatentable over the Shimizu Publication in view of the Luff Patent and Kondo et al. (U.S. Patent No. 5,949,294, hereafter the “Kondo Patent”).

Applicants respectfully traverse the Examiner’s rejections and request reconsideration of the above-captioned application for the following reasons.

C. Applicants’ Arguments

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation, or other legitimate reason, for combining the references in the manner claimed. KSR International Co. v. Teleflex Inc., 127 S.Ct. 1727, 1739-41 (2007); In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). In this case, the Examiner has failed to establish a prima facie case of obviousness against independent claims 12 and 25

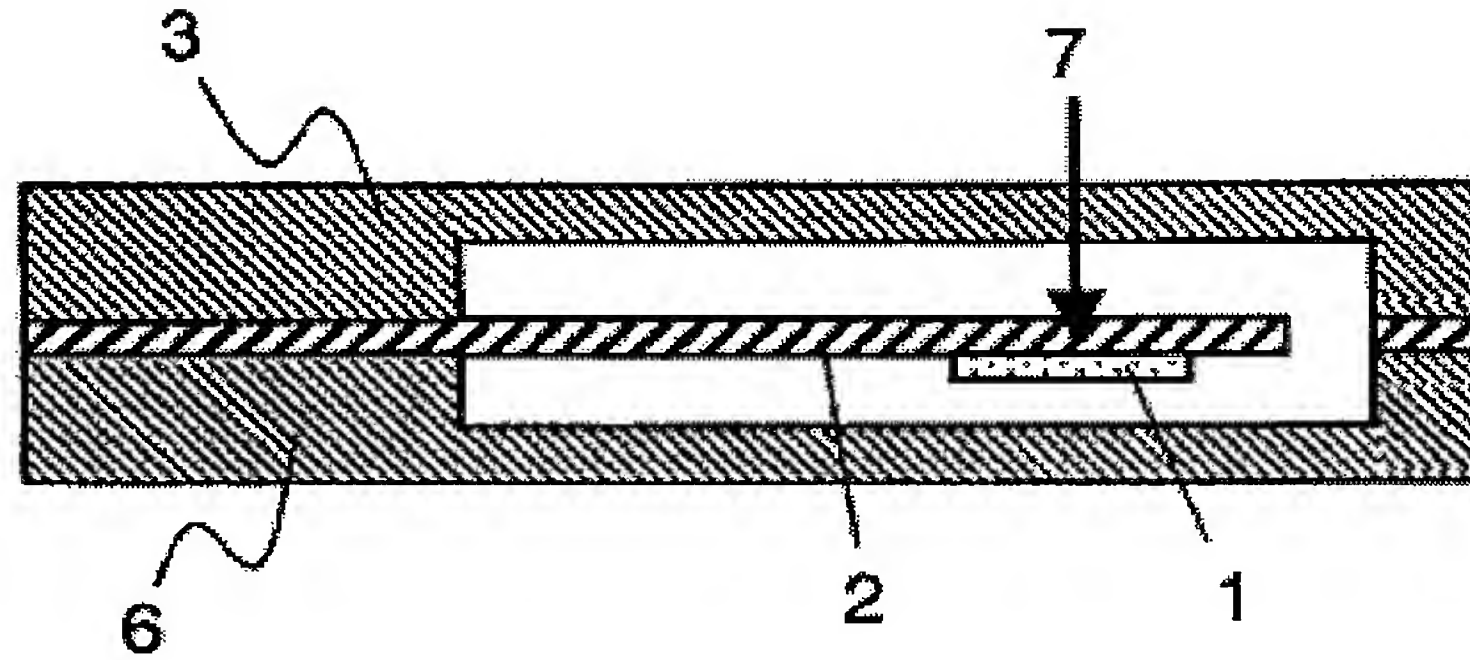
because the combination of the Shimizu Publication, the Luff Patent, the Kizaki Patent and the Kondo Patent fails to teach, or suggest, each and every limitation of these claims.

i. The Shimizu Publication

The Shimizu Publication discloses a “piezoelectric vibrator and manufacturing method thereof,” which pertains to a small piezoelectric vibrator having low equivalent series resistance, and wherein a gettering substance for gettering inner gas is provided in a sealed space formed by a hermetic container where a piezoelectric vibrator piece is arranged (See Abstract of the Shimizu Publication). According to the Shimizu Publication, the gettering substance is formed on a surface of the piezoelectric vibrator piece or on an inside wall of the hermetic container, and a manufacturing process for the piezoelectric vibrator includes (i) a process in which the gettering substance is provided inside the hermetic container, which contains the piezoelectric vibrator piece inside the hermetic container, (ii) a process in which the hermetic container is hermetic-sealed so that the piezoelectric vibrator piece is sealed in the hermetic container, and (iii) a process in which the gettering substance is heated by a laser beam from outside to perform gettering of the inner gas of the hermetic container (See Abstract of the Shimizu Publication).

The Shimizu Publication discloses a piezoelectric vibrator, such as may be used in mobile information technology devices, which includes a quartz resonator piece (2), a glass container (6), a glass cover (3), and a metal film (1) as shown in Figure 1 (Shimizu Publication, ¶¶ [0001], [0021] and [0022]), which is reproduced below for convenience.

FIG. 1



The container (6) is hermetically sealed, and the resonator piece (2) is contained within the container (Shimizu Publication, ¶ [0015]). The vibrator (2) is mounted in the housing on an edge of the base (6) in hard material (i.e., ceramic or glass), and the cover (3) is fixed on a wall of the base (6), (Shimizu Publication, ¶ [0021] and [0026]). A getter material is provided in the housing, and the getter material can be activated by laser beam in order to act as a vacuum pump (Shimizu Publication, ¶ [0028]). The getter material employed by Shimizu may be selected from aluminum, titanium, or zirconium, and a metal alloy containing these elements (Shimizu Publication, ¶ [0028]).

However, the piezoelectric vibrator (i.e., an electronic component) disclosed by the Shimizu Publication does not include any means for protecting the cover (3) against lateral shocks during manipulation of the electronic component even though the resonator piece (2) is made of glass or ceramic, which are friable or breakable materials. Thus, as conceded by the Examiner (Office Action, mailed April 27, 2009, at 4, lines 20-23, and at 5, lines 19-22), the Shimizu Publication does not teach, or suggest, (i)

“the cover is fixed onto a rim of the lateral wall of the main part, wherein the main part is made of a hard material so that one part of the rim entirely surrounds a lateral surface of the cover and ensures protection of the cover of the electronic component against lateral shocks”

and (ii)

“a space is provided between the lateral surface of the cover and the

one part of the rim surrounding the cover, wherein the space is substantially of smaller dimension than the thickness of the cover in order to facilitate mounting of the cover on the rim of the lateral wall of the main part and in order to avoid propagation on the cover of lateral shock against the rim”

as recited by independent claim 12, and (iii)

“the cover is fixed onto a rim of the lateral wall of the main part, wherein the main part is made of a hard material so that one part of the rim surrounds at least certain portions of a lateral surface of the cover and ensures protection of the cover of the electronic component against lateral shocks”

as recited by claim 25.

As also admitted by the Examiner (Office Action, dated April 27, 2009, at 7, line 19, to at 8, line 2; and at 8, line 18, to 9, line 3), the Shimizu Publication does not teach, or suggest (iv)

“the rim of the main part of the case receiving the cover includes a first annular layer of gold plating, wherein a periphery of an inner face of the cover includes a second annular layer of gold plating, and wherein the cover is welded onto the rim using a metal alloy preform arranged between the first annular layer of gold plating and the second layer of gold plating, wherein the metal alloy is formed of tin and gold,”

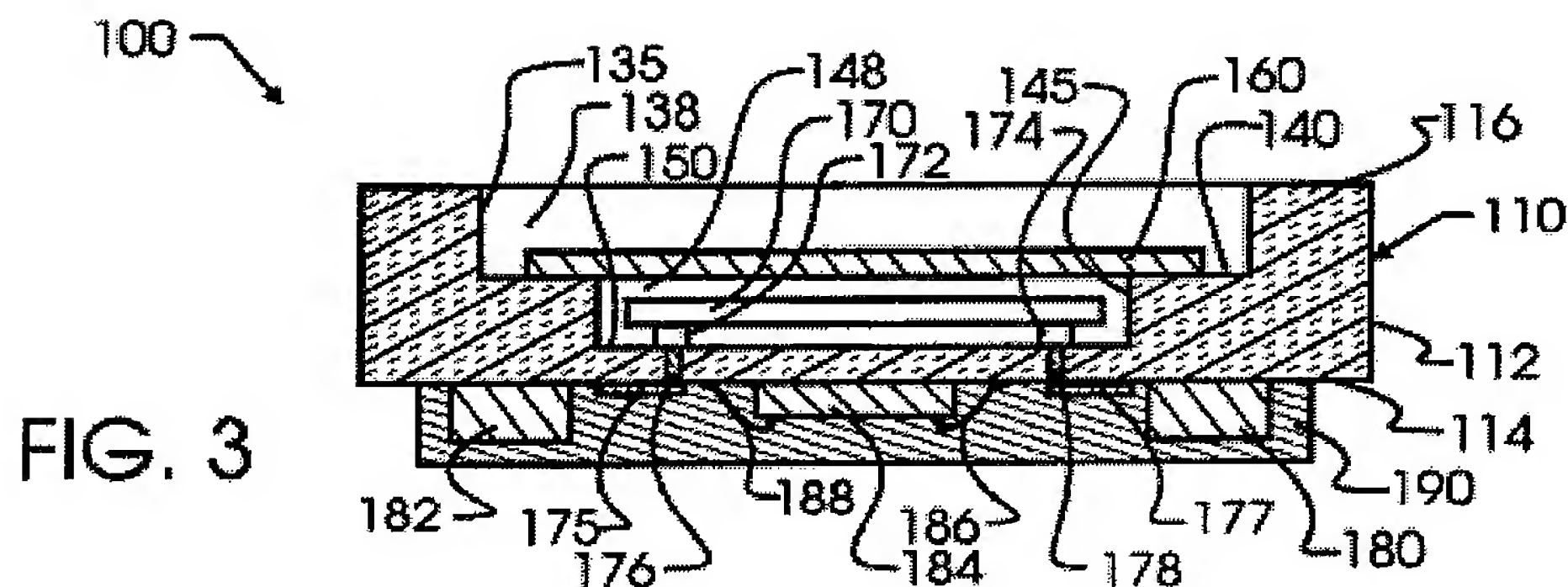
as recited by claim 16, and (v)

“wherein the oscillator circuit is arranged in a second housing of the main part, wherein the second housing is delimited by the lateral wall and the base, and the second housing is arranged on an opposite face of the base to the first housing of the resonator element, wherein said oscillator circuit is encapsulated in the second housing by a resin and is electrically connected to external connection terminals of the electronic component, and wherein the base of the main part of the case includes electrical connection paths for electrically connecting the oscillator circuit and the resonator element,”

as recited by claim 20.

ii. The Luff Patent

The Luff Patent discloses a “temperature compensated crystal oscillator assembled on crystal base” as shown in Figure 3 (which is reproduced below for convenience), which



pertains to a dual-cavity temperature compensated crystal oscillator (100) provided with a three-layer ceramic package (110), and with a crystal (170) sealed in a well or cavity (148), (See Abstract of the Luff Patent). The Luff Patent also discloses that oscillator components (180) to (184), such as a compensation circuit and an oscillator, are attached through screened solder onto the back side of the ceramic package (110) and are encapsulated within potting compound or encapsulant (See Abstract of the Luff Patent). The electrical connection of the Luff device is provided between the oscillator and compensation circuitry and the piezoelectric element (170) to produce a frequency-controlled oscillator and, after frequency tuning, a hermetic seal is provided between a cover (160) and ledge (140) to hermetically seal the cavity (148), (See Abstract of the Luff Patent).

As admitted by the Examiner (Office Action, dated April 27, 2009, at 7, line 19, to at 8, line 2; and at 8, line 18, to 9, line 3), the Luff Patent does not teach, or suggest (i)

“the rim of the main part of the case receiving the cover includes a first annular layer of gold plating, wherein a periphery of an inner face of the cover includes a second annular layer of gold plating, and wherein the cover is welded onto the rim using a metal alloy preform arranged between the first annular layer of gold plating and the second layer of gold plating, wherein the metal alloy is formed of tin and gold,”

as recited by claim 16, and (ii)

“wherein the oscillator circuit is arranged in a second housing of the main part, wherein the second housing is delimited by the lateral wall and the base, and the second housing is arranged on an opposite face of the base to the first housing of the resonator element, wherein said oscillator circuit is encapsulated in the

second housing by a resin and is electrically connected to external connection terminals of the electronic component, and wherein the base of the main part of the case includes electrical connection paths for electrically connecting the oscillator circuit and the resonator element,”

as recited by claim 20. However, these are not the only deficiencies in the disclosure of the Luff Patent.

The Luff Patent pertains to a crystal oscillator assembled on a crystal base and is provided with means for compensating for temperature. The main part of the package (110) is made of a hard material such as ceramic (Luff Patent, col. 3, lines 26-29). This electronic component is configured in order to reduce size and to place the crystal resonator near the oscillator circuit in order to compensate for temperature (Luff Patent, col. 2, line 65, to col. 3, line 14). The Luff Patent discloses connection terminals (120) provided through the base of the main part, in ceramic, in order to connect crystal resonator (170) to the integrated circuit (184) placed on an external surface of the base of the main part (Luff Patent, col. 4, lines 25-55, and col. 5, lines 26-39, and Figures 2 and 3). As shown in Figure 3 of the Luff Patent, external terminals (120) are also provided on the external lateral surfaces of the main part in order to allow connection as an SMD component on a printed circuit board. The Luff Patent employs a cover (160) made of Kovar (i.e., a metallic material) fixed on a rim (140) of the main part in order to hermetically close the crystal resonator (Luff Patent, col. 3, lines 2-10 and lines 35-41).

As would be instantly realized by persons of ordinary skill in the art, because the cover (160) is made of Kovar it is not “made with a material that is friable or breakable” as recited by independent claims 12 and 25. Thus, the cover (160) disclosed by the Luff Patent cannot be broken during some routine manipulation of the electronic component and is, therefore, a substantially different cover from the one recited by independent claims 12 and 25 of the above-captioned application.

As shown in Figure 3 of the Luff Patent, one part of the rim (135) surrounds the lateral surface of the cover (160). However, this part of the rim (135) is not provided so as to protect the cover (160), but it is only provided to allow making of external terminals (120) that are used for mounting the electronic component as an SMD component on a printed circuit board (Luff Patent, col. 5, lines 25-53). Therefore, the Luff Patent does not teach, or suggest, (i)

“one part of the rim entirely surrounds a lateral surface of the cover and ensures protection of the cover of the electronic component against lateral shocks”

and (ii)

“a space is provided between the lateral surface of the cover and the one part of the rim surrounding the cover, wherein the space is substantially of smaller dimension than the thickness of the cover in order to facilitate mounting of the cover on the rim of the lateral wall of the main part and in order to avoid propagation on the cover of lateral shock against the rim”

as recited by independent claim 1, and (iii)

“one part of the rim surrounds at least certain portions of a lateral surface of the cover and ensures protection of the cover of the electronic component against lateral shocks”

as recited by claim 25.

With respect to claim 1 and the dimensions of the “space” that is “substantially of smaller dimension than the thickness of the cover,” the Examiner admits that the Luff Patent does not teach this feature, but contends that it would be obvious to change relative dimensions in a device (Office Action, dated April 27, 2009, at 5, line 19, to 6, line 8). In support of this contention, the Examiner cites Gardner v. TEC Systems, Inc., 220 U.S.P.Q. 777 (Fed. Cir. 1984), (Office Action, dated April 27, 2009, at 5, line 19, to 6, line 8). The Examiner’s reliance on Gardner v. TEC Systems, Inc. is inappropriate to the facts of this case for the following reasons.

First, in Gardner v. TEC Systems, Inc., 220 U.S.P.Q. at 783, a single reference by Vits disclosed all of the claimed limitations including dimensional proportions that fell within the scope of the claimed invention. In this case, the Examiner relies upon the combination of the Shimizu Publication and the Luff Patent, and not on a single prior art reference to allegedly disclose all of the claimed limitations except for the “space” that is “substantially of smaller dimension than the thickness of the cover.” As shown in Figure 3 of the Luff Patent, the space between the cover (160) and the rim (135) is substantially of a greater dimension than the thickness of the cover. Therefore, the Luff Patent actually teaches away from the present invention.

Secondly, the dimensional limitation recited by claim 1, wherein the “space” is “substantially of smaller dimension than the thickness of the cover,” provides a non-obvious result in that it prevents any lateral shocks that may otherwise occur against the rim from directly propagating to the cover thereby preventing damage to the cover (See Applicants’ original specification, at 4, lines 22-25). While the Luff Patent discloses a temperature compensated crystal oscillator circuit that includes a three layer package and a crystal sealed in a well or cavity, and that such a structure permits reduction in size of the package (Luff Patent, col. 2, lines 20-27 and lines 41-44), the Luff Patent is silent with respect to decreasing the dimension of the “space” or ledge (140), and it is silent with respect to providing a space in order to protect the cover from any lateral shock propagating from the rim. Therefore, the dimensions of the present invention provide unexpected improvement in preventing lateral shock from propagating to the cover from the rim.

For all of the above reasons, the Examiner’s application of the Federal Circuit’s decision in Gardner v. TEC Systems, Inc., 220 U.S.P.Q. 777 (Fed. Cir. 1984) is not appropriate to the facts of the present case.

iii. The Kizaki Patent

The Kizaki Patent discloses a “surface mounting crystal unit” as shown in Figures 1, 7 and 18, wherein the surface mounting crystal unit comprises a quartz plate, a receptacle-like terminal member holding the quartz plate therein in such a way as to enable it to oscillate, and a lid covering an opening of the terminal member, wherein the quartz plate is prepared in the shape of a rectangular parallelepiped and disposed such that one or both of shorter sides of the quartz plate at its both ends can be fixedly attached to flat surface portions of the terminal member with an electrically conductive adhesive of high plasticity so that the impact of a drop is buffered by the adhesive (See Abstract of the Kizaki Patent). The Kizaki Patent discloses that leakage is minimized by airtight bonding of the lid to the opening of the terminal member with an inorganic material such as a solder, and that crystal impedance is lowered by producing a vacuum inside the terminal member airtightly bonded by the lid (See Abstract of the Kizaki Patent). The Kizaki Patent also discloses a solder consisting of tin and gold, electrode pads (4) and sealant (18) plated with gold, and a lid made of metal, plated with nickel and then plated with gold (Kizaki Patent, col. 4, lines 50-54, col. 6, lines 13-20, and col. 7, lines 43-51).

iv. The Kondo Patent

The Kondo Patent discloses a “reference frequency source oscillator formed from first and second containers,” as shown in Figures 1 to 10, wherein the oscillator includes an active element (2) mounted inside a first container (1) whose upper surface is opened, and not only the opening of the first container (1) is closed by an oscillating unit (3) having an oscillating element (6) incorporated therein, but also the oscillating unit (3) is attached onto the opening of the first container (1) so that second connecting electrodes (11a) to (11d) of a second container (5) of the oscillating unit (3) are electrically connected to first connecting

electrodes (14a) to (14d) of the first container (1), (See Abstract of the Kondo Patent). According to the Kondo Patent, the oscillating element (6) and the active element (2) can be accommodated in separate containers, which prevents organic substances derived from an active element fixing adhesive from being deposited on the oscillating element, but also permits reuse of parts that are not defective if the active element or the oscillating element is damaged by separating the first container from the second container (See Abstract of the Kondo Patent).

v. Summary of the Disclosures

The combination of the Shimizu Publication, the Luff Patent, the Kizaki Patent and the Kondo Patent does not teach, or even suggest, (i)

“one part of the rim entirely surrounds a lateral surface of the cover and ensures protection of the cover of the electronic component against lateral shocks”

and (ii)

“a space is provided between the lateral surface of the cover and the one part of the rim surrounding the cover, wherein the space is substantially of smaller dimension than the thickness of the cover in order to facilitate mounting of the cover on the rim of the lateral wall of the main part and in order to avoid propagation on the cover of lateral shock against the rim”

as recited by independent claim 1, and (iii)

“one part of the rim surrounds at least certain portions of a lateral surface of the cover and ensures protection of the cover of the electronic component against lateral shocks”

as recited by claim 25. The combination of the Shimizu Publication, the Luff Patent, the Kizaki Patent and the Kondo Patent also fails to teach, or suggest, the subject matter of new claims 28 and 29.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against independent claims 1 and 25 of the above-captioned invention.

vi. No Legitimate Reason to Justify the Combination and No Reasonable Expectation of Success Even if the Combination Proposed by the Examiner Was Made

A proper rejection under Section 103 requires showing (1) that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process, and (2) that the person of ordinary skill in the art would have had a reasonable expectation of success in doing so. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, the Examiner has failed to establish a prima facie case of obviousness against independent claims 12 and 25 because the Examiner has not established a legitimate reason to justify the combination of the Shimizu Publication, the Luff Patent, the Kizaki Patent and the Kondo Patent, and the Examiner has failed to demonstrate that a person of ordinary skill in the art would have had a reasonable expectation of success of obtaining the claimed invention even if the combination of disclosures was made.

Specifically, the part of the rim disclosed by the Luff Patent, which surrounds the lateral surface of the cover (160), is not positioned to protect against lateral shocks. Therefore, a person of ordinary skill in the art would not have a reason to modify the device disclosed by Shimizu, which has no structure for protecting the cover from lateral shocks, with the “space” disclosed by the Luff Patent because the Luff Patent does not disclose providing a rim to protect the cover with that part of the rim surrounding the cover in accordance with the embodiments of claims 12 and 25. Furthermore, with respect to claim 12, the Luff Patent does not teach, or suggest, providing a “space” that is “substantially of smaller dimension than the thickness of the cover in order to facilitate mounting of the cover

on the rim of the lateral wall of the main part and in order to avoid propagation on the cover of lateral shock against the rim.”

Furthermore, because the cover (160) disclosed by Luff is made of Kovar and like metallic materials, it is not breakable or friable. Consequently, a person of ordinary skill in the art would have no reason to protect the cover disclosed by the Luff Patent from lateral shocks. For all of the same reasons, a person of ordinary skill in the art would have absolutely no reasonable expectation of success of arriving at Applicants’ claimed invention by combining the disclosures of the Shimizu Publication, the Luff Patent, the Kizaki Patent and the Kondo Patent.

For all of the above reasons, the Examiner has failed to establish a prima facie case of obviousness against independent claims 12 and 25.

III. CONCLUSION

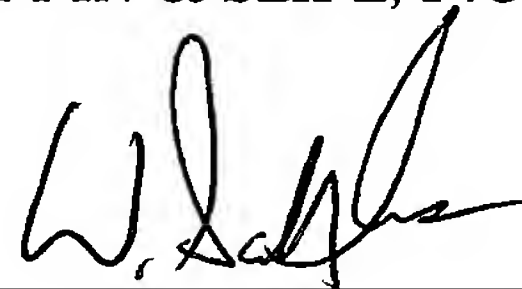
The Examiner has failed to establish a prima facie case of obviousness against independent claims 12 and 25 because the combination of the Shimizu Publication, the Luff Patent, the Kizaki Patent and the Kondo Patent fail to teach each and every limitation of these claims, the Examiner has failed to adduce a legitimate reason to justify making the proposed combination, and because the Examiner has failed to demonstrate that a person of ordinary skill in the art would have had a reasonable expectation of success of obtaining Applicants’ claimed invention even if the proposed combination was made.

For all of the above reasons, independent claims 12 and 25 are in condition for allowance, as are claims 13-16, 18-23 and 25-29 that depend either directly or indirectly upon either claim 12 or claim 25, and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below-signed attorney for Applicants.

Respectfully submitted,

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